NOTES ON THE THELEPHORACEAE OF NORTH CAROLINA

By W. C. Coker

Plates 14–35

Plants (the fruiting body) of this family varying from fibrous and tough and leathery to waxy when wet, in some species hard and brittle; form various, upright and fan-shaped to funnel-shaped (and simple or branched) or shell-shaped to bracket-shaped and laterally attached, or partially to completely spread out on the substratum (resupinate); the hymenium borne only on one surface, or rarely all over the fruit-body (amphigeneous), smooth (without teeth, pores or gills) or nodulated or wrinkled; basidia simple and club-shaped, usually with four spores (2–8). The great majority grow on dead wood, some grow on the ground, and some are parasitic.

Most of the genera of this family are composed of very insignificant species of slight popular or economic interest, except where involved in the rotting of timber. We have tried to treat fully only a few of the genera, in others we include only a few species as representative. All of the North American genera of this family are being carefully monographed by Dr. Burt, and his work, if published, is referred to under each genus. See also Massee: *A Monograph of the Thelephoraceae.* Journ. Linn. Soc. Bot. 25: 107. 1889; 27: 95. 1890, and Wakefield: *Some Notes on the Genera of the Thelephoraceae.* Trans. Brit. Myc. Soc. 4: 301. 1914. See also Bourdot and Galzin as cited under the genera. Interested students can turn to these papers for a fuller treatment.

Many of the drawings of Corticium, Peniophora, Hypochnus, and Coniophora were made by Mr. J. N. Couch, recently assistant in Botany. Miss Alma Holland, assistant in Botany, has inked in most of the drawings and made most of the spore drawings. The photographs and a good many of the drawings were made by the author.

Key to the Genera Treated

Parasitic on members of the Heath Family, causing galls or other abnormalities; spore-bearing surface forming a thin, adherent coat on the host ..... *Exobasidium* (p. 147)

Addenda

Add to the literature list given on page 146 the following: Höhnel and Litschauer, *Beiträge z. Kenntnis d. Corticieen.* Sitzungsb. K. Akad. Wiss. Wien **115:** 1549, with 10 text figs. 1906; **116:** 739, pls. 1-4 and 20 text figs. 1907; **117:** 1081, with 10 text figs. 1908. This series treats many species of most of the genera included by us.

Entirely resupinate on rotten wood; the context filled with brown stellate bodies (cystidia)..... *Asterostroma* (p. 164)
Not as above in all respects.
Plant entirely resupinate, forming a crustaceous layer on wood with no shelving margin, or if with a narrow shelving margin then with dark spines in the hymenium; in one species of *Aleurodiscus* forming small cup-shaped, centrally attached plants with the margin upturned all around and in *Corticium lilacino-fuscum* and *Peniophora albomarginata* there may be a very narrow shelving margin.
Spores and basidia large to very large, the spores plump with the surface spiny or minutely rough; plant small, chalk-white or in one species the hymenium fawn-brown..... *Aleurodiscus* (p. 152)
Spores smaller, elongated to subspherical.
Spores rough or echinulate, colored..... *Hypochnus* (p. 165)
Spores smooth, ochraceous or rusty or brown..... *Coniophora* (p. 157)
Spores smooth, white.
Hymenium with smooth, spine-like, dark setae projecting above the basidia..... *Hymenochaete* (p.166)
Hymenium with specialized pale cystidia (club-shaped cells, which are usually warted) mixed with the basidia..... *Peniophora* (p. 158)
Hymenium without setae or cystidia..... *Corticium* (p. 168)
Plants growing on wood (in all here treated), shelf-like or petal-like, usually imbricated; spores white or pale, smooth..... *Stereum* (p. 175)
Plant growing on wood or herbs or moss, very small, cup-shaped or saucer-shaped and centrally attached, often pendulous by a little stalk (compare also *Aleurodiscus Oakesii*)..... *Cyphella* (p. 148)
Much like *Cyphella*, but more crowded and the fruiting bodies either more cylindrical or arising from a resupinate basal weft..... *Solenia* (p. 150)
Plant upright, fan- or funnel-shaped, or branched like a tree, or in a few species bracketed like a Stereum when growing on wood; leathery; usually on earth, at times on wood; spores dark, warted..... *Thelephora* (p. 185)
Plant tough and elastic, but fleshy, repeatedly branched into a thick mass of flat, contorted-anastomosing branches; growing from rotting roots or stump bases. *Sparassis* (p. 193)

EXOBASIDIUM

Parasitic on leaves, shoots and flowers of woody plants, mostly if not entirely confined to the Ericaceae, and forming on the surface of the host, which is usually hypertrophied or deformed into galls, a

layer composed rarely of basidia alone, or more rarely of a thin felted layer of interwoven hyphae which bears basidia and conidiospores. Basidia clavate, simple. Spores white, smooth, simple or septate.

The galls and other abnormalities produced vary so much, depending on what host or what part of the host is attacked, that many so-called species names have been published depending on the kinds of galls formed. Burt, who has studied the subject thoroughly, has concluded that almost all of these belong to one species, *E. Vaccinii* (Ann. Mo. Bot. Gard. 2: 627. 1915). He recognizes only two other species or varieties, one *E. Vaccinii uliginosi* Boud., the other *E. Symploci* Ell. & Martin. The latter is parasitic on *Symplocos tinctoria*, but in it the basidia and basidiospores have not been found. For an excellent article on the morphology of this group see Woronin, Naturforsch, Ges. Freiburg, Verhandl. 4: 397. 1867.

Exobasidium Vaccinii (Fuckel) Woronin.

PLATE 14

Characters of the genus: Basidia four-spored; basiospores 2.5–5 × 10–20μ. (Burt). Occurring on many genera and species of the Heath Family.

The most conspicuous and best known gall caused by *E. Vaccinii* in North Carolina is the one called honeysuckle apples, which are large, hollow, pale, sweetish, juicy formations often an inch or more thick that many children know and eat. They are found on *Azalea nudiflora* and *A. atlantica* and seem most abundant in the Coastal Plain. Another remarkable hypertrophy occurs on *Andromeda Mariana*, causing the flowers which are normally white and waxy subcylindrical bells, to become changed into larger, greenish, more open flowers with the petals more or less separated or quite free and spreading. This is shown in our illustration, together with the normal flowers. This is the form that has been named E. *Peckii*.

11a. On *Andromeda Mariana* near east gate of campus, May 6, 1909. Photo.

CYPHELLA

Very small, cup-shaped or beaker-shaped or saucer-shaped, attached by the center with a short stalk usually, and often hanging downward, the lower, concave surface covered by the hymenium; texture submembranaceous; basidia simple. The species grow on

PLATE 14

EXOBASIDIUM VACCINII on ANDROMEDA MARIANA.
Normal flowers above; hypertrophied ones below.

live mosses, dead stems and leaves of herbs, fallen twigs, branches and bark of trees, etc. Two of the species recognized by Burt have been reported from North Carolina by Curtis, and we are adding two others. See Burt, Ann. Mo. Bot. Gard. 1: 358. 1914; Bourdot and Galzin, Bull. Soc. Myc. Fr. 26: 223. 1910.

KEY TO THE SPECIES

On living mosses; saucer- or petal-shaped, up to 1 cm. broad...*C. muscigena* (1)
On alder bark; small, cup-shaped, reddish-tawny.....*C. fasciculata* (2)
On bark of red cedar; very small, whitish, cup-shaped, spores with a few long spines.....*C. cupulaeformis* (3)
On dead stems of herbs; cup-shaped, whitish.....*C. capula* (4)

1. Cyphella muscigena (Pers.) Fr.

PLATE 30

This is the plant treated by me as *Cantharellus retirugis* (No. 3224) in an earlier paper (Journ. E. Mit. Sci. Soc. 35: 38. 1919). Since then we have made three other collections of the plant, one from the same spot a year later and two from other places. The two last mentioned showed spores (from good spore prints) that averaged longer than the two others, but otherwise there is no difference in the plants. The basidia of all are small, club-shaped, rather abruptly enlarged at the end, 7–7.5 μ thick, 4-spored. I cannot make out any difference of importance between descriptions and illustrations of *Cantharellus retirugis* and *Cyphella muscigena*.

3224. See above.
3931. On living moss (*Catharinia*), below Cobb's Terrace, January 8, 1920. Spores pip-shaped, 3–4.2 × 7–9.7μ.
4010. Same spot and one on same kind of moss as No. 3224. Spores the same, 3.7–4.5 × 6–8.5μ.
4018. Near No. 3931, but on different moss, January 24, 1920. Spores 3–4.5 × 7.5–9.7μ.

2. Cyphella fasciculata (Schw.) B. & C.

C. fulva B. & Rav.

PLATE 30

Cups gregarious in good numbers, and often in part densely fascicled in groups or lines, about 0.6–3 mm. broad and same length, attached in center by a short stalk about 0.3–0.8 mm. long; outer surface of cup reddish-tawny, usually with one or two circular zones,

finely tomentose with curled hairs. Hymenium smooth, pale straw or light buff, lining the inside of the cup, the mouth of which is whitish and contracted or, when wet and fully mature, open.

Spores (of No. 4001, spore print) cylindric, curved, smooth, white, 2–3 × 7.5–11μ. Basidia 5–6.5μ thick, flat at end, with four very small and short sterigmata.

4001. On dead Alnus twigs, January 22, 1920. Not fascicled in this collection.

4017. On dead Alnus twigs, January 24, 1920. Many densely fascicled groups in this lot, also many single ones.

Common on branches of alder (as *C. fulva*). Curtis.

3. **Cyphella cupulaeformis** Berk. & Rav.

PLATE 30

Centrally attached by a very short stalk; plant up to 1.5 mm. long by 2.5 mm. broad, cup-shaped or goblet-shaped, the outside minutely scurfy and pale gray-brown, the hymenium inside the cup smooth and about the color of the outside; the mouth open when wet, collapsed and practically closed when dry.

Spores white, very remarkable in being set with six or more spines which are about 3.7μ long, body of spore 4.5–5.5 × 5.5–6μ. The spines do not appear until the spores are nearly grown, the spores up to that time being smooth and oval; as the spines begin to develop the spores appear simply angular for a while. Basidia club-shaped, 8μ in diameter.

4019. On decaying cedar limb, January 24, 1920.

4. **Cyphella capula** (Holmsk) Fr.

We have not yet found this and adapt the following from Burt (l. c., p. 366).

Growing on dead stems of herbs and forming little whitish, pendulous cups drawn out to a stalk, the entire plant about 1–3 mm. long and 0.5–2 mm. broad; hymenium on the inside of the cup; outside of the cup and stem glabrous; the cup margin irregular.

Spores white, flat on one side, 3–3.5 × 4.5–6μ.

Common on stems of herbs. Curtis.

SOLENIA

Fruit bodies in the form of small to very small cups or tubes which are commonly so closely set as to appear almost as a continuous stratum to the naked eye. The cups are somewhat contracted

at the mouths and are seated directly on the substratum or are surrounded at base by a very delicate weft of threads, the subiculum. The smooth hymenium covers the inside of the cups. Basidia club-shaped with usually 4 sterigmata. Spores smooth, white (at least in *S. poriaeformis*). Distinguished from *Cyphella* by the more densely crowded cups which often arise from a superficial weft, and in some species by the more elongated, cylindrical cups.

A peculiar genus that has been placed usually in the Polyporaceae, but is probably better treated in the Thelephoraceae as its relationship to Cyphella seems obvious. It is placed next to Cyphella in Engler and Prantl's system (Hennings), and also by Bourdot and Galzin (Bull. Soc. Myc. Fr. 26: 225. 1910), which see for a good treatment of the French species. See also Rabenhorst, Krypt. Flora Deutschland, etc. 11: 390. 1884.

To represent this genus we are including only one species. In American herbaria are represented commonly about ten other species among which the most widely distributed are *S. anomala*, *S. candida*, *S. ochracea*, *S. stipitata* and *S. villosa*. All or nearly all known species grow on dead wood and branches or dead herbs (one is said to grow on dung).

Solenia poriaeformis (DC.) Fuckel.

PLATES 15 AND 30

Plant forming encrusting, non-removable patches quite variable in size and irregular in outline, which often fuse to make much elongated areas with rather definite margin; composed of a layer next the bark made up of extremely delicate, interwoven, white threads, about 1.2–2.5μ thick, in which are imbedded for about ⅓–½ their depth, minute, circular, or somewhat flattened cups, about 4 or 5 to a millimeter, which usually cover the entire surface and nearly touch when expanded, are about 90–110μ deep and are covered all over the outside with white, granular, easily removable powder, while the inside is covered with the smooth hymenium. Under moderate power the cups look like citron covered with sugar powder, and when the powder is rubbed off they are seen to be deep brown, contrasting strongly in section view with the white felt in which they are sitting. Wall of cups about 30–40μ thick, brown, the hymenium occupying a little less than half of this thickness and less dark than the closely woven outer part; margin incurved and partly closing the cups even

when wet. The color of the plant in the fresh state a dull white, which is a little darkened by the small openings of the cups and is almost entirely due to the fine white powder covering the exposed parts of the matrix as well as the outside of the cups. When very young the plant is thin and sterile, with a minutely granular appearance. The cups first appear as very small openings extending to within ⅓ mm. of the margin; later, when expansion ceases, they are formed almost to the marginal line.

Spores (of No. 4686) white, smooth, oval, 3.5–4.5 × 5–7.5μ. Basidia clavate, 4-spored, 6.5μ thick. A most peculiar plant differing from other species of Solenia in the short, partly embedded cups. We have compared our plants with several collections from America and one from Bresadola at the New York Botanical Garden and find them similar in all essentials. Most other collections have the cups less crowded and in some they are broader. Our plant seems to be a dense, small-cupped form Bourdot and Galzin give microscopic characters which agree with ours, as spores 4–5× 4.5–6.5μ, basidia 5–8 × 18–24μ, 2–4 sterigmata; and Dr. Burt writes me that a collection made by him in Sweden has spores 4.5–5 × 5–6μ. Hennings, in the Pflanzenfamilien, gives the spores as 3–3.5 × 11–14μ, which is probably an error.

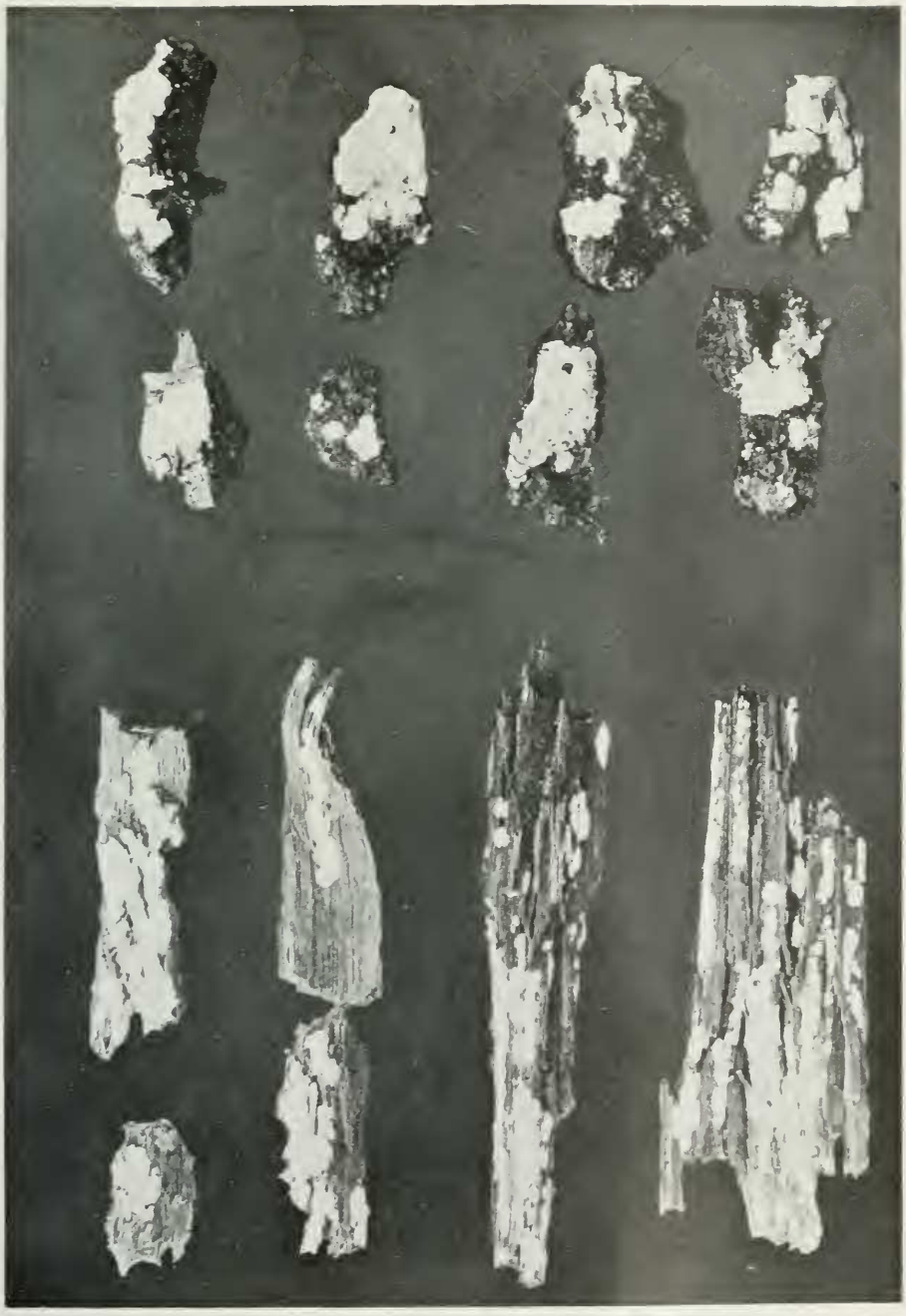
4275. On dead bark of old live grapevine (*V. aestivalis*), April 15, 1920. Spores pure white, short, oval.
4317. On bark of Vitis, May 28, 1920.
4686. On dead bark of live, wild grapevines, November 13, 1920.
4700. On bark of live grapevine, December 4, 1920. Poorly developed specimens with few cups.

ALEURODISCUS

Plants in the species here treated growing on the bark of living trees or dead shoots and forming entirely resupinate, white, small, thin or thickish crusts with well-defined margins (the margin at times is vague in *A. botryosus*) and hard, brittle flesh; or in one case forming small cups with the margin free all around. Basidia and spores large to very large; spores white, minutely punctate or spiny; no cystidia or setae present, but paraphyses often of peculiar form occur in the hymenium or throughout.

Other groups of species included by Burt in this genus, but not treated by us, have other characters separating them from the Stereums. See Burt, Ann. Mo. Bot. Gard. 5: 177. 1918; Bourdot and

PLATE 15



ALEURODISCUS MACRODENS. No. 4734. [Above.]
SOLENIA PORIAEFORMIS. No. 4686. [Below.]

Galzin, Bull. Soc. Myc. Fr. 28: 349. 1912; Lloyd, Mycological Notes No. 62: 926, Pl. 147, figs. 1666–1681 and Pl. 148, figs. 1682–1688, and Pl. 145, fig. 1652. 1920. For morphology and cytology of *A. amorphus* see Am. Journ. Bot. 7: 445, Pls. 31–33. 1920.

KEY TO THE SPECIES INCLUDED

On bark of living trees.
  Spores very large, not smaller than 12 × 15μ.
    Flesh pliable and leathery when wet, margin free and upturned all around.....*A. Oakesii* (1)
    Flesh hard and woody even when damp, margin not free or scarcely so.
      On post oak or white oak; spores oval-elliptic, minutely punctate.....*A. candidus* (2)
      On elm; spores subspherical to short-oval, very minutely punctate (some appearing smooth).....*A. candidus* var. *sphaerosporus* (3)
      On ash; spores subrectangular, set with a few large, blunt spines.....*A. macrodens* (4)
      On cedars; spores subspherical to short-oval, covered with minute, slender spicules.....*A. nivosus* (5)
  Spores not larger than 7 × 12μ.
    On maples (said also to grow on ash, elm and white oak); thinner and smaller than any of the above, irregular.....*A. acerinus* (6)
    On dead shoots of blackberry, lilac, etc. Spores 7.5–11 × 14–19μ.....*A. botryosus* (7)

1. **Aleurodiscus Oakesii** (B. & C.) Cooke.

PLATE 30

Small, saucer-shaped or shallow cup-shaped, rather broadly attached by the center, the margin quite free all around and curved up when damp, incurved over the hymenium when dry, the exposed outer (lower) surface white and fibrous, especially on margin and near attachment so as to appear tomentose; hymenium even or a little wavy, minutely pulverulent, pale avellaneous (light fawn brown) both when wet and dry. Flesh about 0.5 mm. thick, leathery and pliable when wet, rigid when dry.

Spores ovoid, white, minutely papillate-warted, 12–16 × 15–20μ. Basidia very large, 15–16μ thick with 4 large sterigmata. Paraphyses often moniliform by constrictions mostly with prong-like short branches at the tip or lower down.

The plant resembles in form a small Stereum attached by the center. Single plants are about 3–5 mm. broad when damp and expanded, but they fuse more or less completely when they touch, so

that elongated or irregular groups are produced which may be a cm. or more long and broad. When two plants meet and fuse a low ridge is left on the hymenium. This plant is easily distinguished from the other species of the genus here treated by the saucer-shaped form and pliable, leathery texture when wet.

3937. On bark of Ulmus near upper end of Scott's Hole, January 11, 1920. Photo.
Upper district. Bark of white oak. Curtis (as Corticium).

2. **Aleurodiscus candidus** (Schw.) Burt.

Stereum candidum Schw.

PLATES 16 AND 30

A small, entirely resupinate plant, growing on the bark of trees and forming hard, crustaceous, chalk-white patches of irregular shape and definite outline, usually under 2 cm. in diameter vith the margin free so as to show its under side which is blackish. Surface smooth, minutely pulverulent under a lens, showing irregularities of the bark over which it is spread. Flesh thick for so small a plant, about 0.5–1 mm. thick, white or pale creamy, quite hard and brittle. Under a lens the flesh shows a rather faint stratification with as many as 5 or 6 layers, each probably representing a period of fruiting, but the time required to form each layer is not yet known.

Spores white, subspherical to short-oval, minutely papillate, 12.5–16.7 × 16.6–22μ, most about 15 × 20.4μ. Basidia large, club-shaped, 11–14μ thick, with four very long sterigmata. Mixed with the basidia are delicate, dense, hyphal paraphyses branched like a bush above and much encrusted with granular crystals.

The plant is very common in Chapel Hill on bark of post oak and white oak, and is very easily recognized by its color, habit and place of growth. Burt describes the spores as smooth, but suggests that they may prove to be minutely rough walled. We find them minutely papillate.

1377a. On bark of post oak trees, November 28, 1913.
1517. On bark of a post oak tree, December 14, 1914.
3827. On living post oak, December 6, 1919.
Salem. Schweinitz.
Low and middle districts, bark of trees. Curtis.

3. Aleurodiscus candidus var. sphaerosporus n. var.

PLATE 30

Plant exactly like *A. candidus* except for smaller average size of the crusts and for the more spherical spores. The chalk-like, minutely pulverulent surface and hard, friable, pale flesh are the same in both. The smaller, more broken up pads seem to be the result of the more fragmented and mossy bark of the elm. The spore difference is constant here and taken with the different host furnishes about the right grounds for establishing a variety.

Spores (of No. 3902) nearly spherical, white, very faintly rough, 13–20 × 15.5–24μ, most about 16.3 × 19.2μ. Basidia large, about 13μ thick. The spores are even more faintly rough than in *A. candidus*.

To be found on most elm trees in Chapel Hill.

2021. On elm (*Ulmus alata*), March 10, 1916.
3902. On elm (*U. alata*), December 16, 1919.
3907. On elm (*U. alata*), December 18, 1919. Spores exactly as in No. 3902.

4. Aleurodiscus macrodens n. sp.

PLATES 15 AND 31

Forming irregular, often somewhat elongated patches about 2 mm. to 2 cm. long with well-defined margins and with much the aspect of *A. candidus;* surface minutely pulverulent, pure white or when old and weathered pale cream; entire thickness only about 150–190μ, the structure in section much obscured by very small crystals and the densely branched paraphyses.

Basidia entirely embedded, 12–15μ thick, irregular and bent, with four long, stout sterigmata, which only reach the surface by their tips. Spores (of No. 4734, print) commonly rectangular in outline, the surface set with a few large, irregularly placed, bluntly pointed spines which are up to 4μ long; body of spore 11.5–15 × 18.5–27μ

In passing the plant would be taken for *A. candidus,* but when examined is seen to be much thinner with the closely pressed margin not showing a dark underside. The spores are remarkable and unlike any others in the genus.

4734. On bark of a living tree of *Fraxinus,* December 14, 1920. Type.

5. **Aleurodiscus nivosus** (B. & C.) H. & Litsch.

Stereum acerinum var *nivosum* B. & C.

PLATES 16 AND 31

Plant forming crust-like elongated patches of definite outline, about 1–23 mm. long by 1–4 mm. broad, the elongated axis vertical, at first thin like a streak of whitewash, then thickening into a mattress-like patch about 0.5–0.7 mm. thick with a free margin that is black below; in age cracking across to make smaller areas as in *Stereum frustulosum*. Surface always chalk-white. Flesh brown below a thin surface layer; hard, dry and rather friable.

Spores (of No. 3897) white, oval, with a small, distinct mucro and short, sharp, delicate spines, 12.9–15.9 × 15.9–21.5μ. A few spores show a remarkable variation in having small blunt warts like a Hydnum.

Very common, and to be found on almost every cedar tree. Differs from *A. candidus* in more spiny spores, proportionately narrower, longer and thinner fruiting bodies, and in growth on cedar. Burt's description of the spores as smooth is incorrect for our specimens. The close-set, slender spicules distinguish the plant at once. Burt also describes the plant as thin with margin not free as in *A. candidus*. This is true only for the young condition. As growth continues the flesh becomes thicker and cracks across and the margin becomes free and shows the blackish outer (under) side.

3897. On bark of living cedar, December 14, 1919.
3920. On living cedar tree, December 22, 1919.

6. **Aleurodiscus acerinus** (Pers.) H. & Litsch.

A smaller and thinner species than the others treated; crustaceous, irregular to subcircular or rarely elongated, up to about 3 mm. wide or when elongated up to a cm. long; chalk-white, minutely pulverulent, the abrupt margin definitely outlined. Hymenium containing slender branched paraphyses that are much encrusted with crystals.

Basidia clavate, about half as large as in *A. candidus*, sterigmata four, elongated. Spores (according to Burt) white, smooth, 6–7 × 10–12μ.

2020. On bark of living deciduous tree, December, 1915. We have misplaced this collection which was seen and determined by Burt, and so have not been able to make original observations on the spores.

Common on bark of trees. Curtis (as Stereum).

PLATE 16

ALEURODISCUS CANDIDUS. No. 3827 [above].
ALEURODISCUS NIVOSUS. No. 3897 [below].

7. Aleurodiscus botryosus Burt.

PLATE 31

Entirely effused to form elongated patches up to 5–6 cm. or smaller, more scattered patches. Surface under a lens more or less lacunose and granular-looking except in the thickest places where it is continuous; pure white or creamy, smooth, and removable as a soft, flexible membrane when wet; thickness in our collection only 45–65μ, nearly all of which consists of the hymenium, in which are embedded a large number of subspherical, amorphous, irregular bodies, probably of a proteid nature. Many bottle brush paraphyses present in hymenium.

Basidia 11–12μ thick, with four long, curved sterigmata 14–16μ long. Spores white, minutely rough, oval with an abrupt mucro, flattish on one side, very granular when shed, sprouting freely over night in a damp chamber, 7.5–10.5 × 14–19μ.

Except for its thinness, amounting to scarcely more than a hymenium on the substratum, our plant agrees well with Burt's species and our determination has been confirmed by him.

4710. On dead blackberry in low place, Glen Burnie Farm, December 5, 1920.

4724. On standing dead shoot of lilac, December 12, 1920. Spores white, surface minutely warted, 8.5–11 × 14.8–18.5μ.

4740. On dead vine of *Vitis* (*aestivalis ?*) December 18, 1920. Spores white, surface minutely rough, 8.5–11 × 14.8–18.5μ.

CONIOPHORA

Entirely resupinate, fleshy, subcoriaceous or membranaceous; hymenium undulate, tubercular, granular or even; basidia simple; spores smooth or slightly angular, ochraceous or at times nearly colorless. Saprophytic on dead wood, often causing serious decay of structural timber. Burt reports three species from North Carolina and nineteen from North America. See Burt, Ann. Mo. Bot. Gard. 4: 237. 1917. Also see Massee in Journ. Linn. Soc. (Bot.) 25: 128. 1889. We are including but one species.

Coniophora arida (Fr.) Karsten.

PLATE 31

Irregularly effused, membranaceous when wet, forming long, thin, narrow patches about 1–3 cm. broad by several cms. long and about 175μ thick on average, with indeterminate margins. Color

when dry a warm buff to buffy brown, usually darker in center. Surface even, pulverulent, sparingly cracked in places; context made up of loosely packed, thin-walled, hyaline hyphae 2–3.7μ thick; hymenium closely packed. No cystidia and no crystals present.

Spores fuscous in a good spore-print, smooth, elliptic with a distinct mucro, 6.6–7.2 × 9.3–11.1μ. Basidia club-shaped, swollen considerably at the distal end; extending out above the hymenium up to 20μ (counting the sterigmata); 8.5μ thick, sterigmata 4, prong-like, curved.

4219. On bark and wood of dead pine, March 23, 1920.
4235. On bark of pine log, April 15, 1920.

PENIOPHORA

Entirely resupinate as a thin encrusting layer, as in Corticium, but differing from the latter in having specialized cystidia included in the hymenium and usually projecting as far as the basidia or beyond them. We are including one (*P. albomarginata*) which often has a narrowly reflexed margin. The cystidia are commonly warted on the distal half, in which case they are easily distinguished. Spores smooth, white or (when fresh) pink. Hymenochaete differs in having dark, smooth, spine-like setae projecting far above the basidia. The pink color shown by a fresh spore print in several species we have studied fades out after a few months in the herbarium. We have included six species to represent the genus, which is a large one and often difficult to distinguish from Corticium. See Massee in Journ. Linn. Soc. (Bot.) **25**: 140. 1889; Bourdot and Galzin, Bull. Soc. Myc. Fr. **28**: 372. 1912; Cooke, Grevillea **8**: 17. 1879; Bresadola, Ann. Myc. **1**: 100. 1903 (as Kneiffia). See also Gleocystidium as treated by Bourdot and Galzin in Bull. Soc. Myc. Fr. **28**: 354. 1912. This last genus includes species usually treated under Peniophora, but its recognition, as Burt has well said, would lead to difficulties without compensating advantages. Other proposed genera as Peniophorella and Gloeopeniophora have similar objections. For a species parasitic on chrysanthemum (*Corticium* (*Peniophora*) *Chrysanthemi* Plowr.) see Trans. Brit. Myc. Soc. for 1904, p. 90. 1905.

KEY TO THE SPECIES TREATED

On pine wood, making an extensive, pale, sub-translucent, parchment-like membrane when dry; sub-waxy when wet.....*P. gigantea* (1)

On deciduous woods, mostly with bark on.
Margin distinct and often uplifted a little in places.
Deep brown with a conspicuous whitish border; surface velvety, not cracking.....*P. albomarginata* (2)
Brownish purple; finely cracked superficially when dry.....*P. violaceo-lividum* (3)
Margin very thin and indistinct, closely adnate;
Light gray to white with creamy areas, texture loose and velvety-looking; spores very long and narrow, 2–2.6 × 13–16.6μ.....*P. longispora* (4)
Not as above.
Deep blackish brown when wet, a much lighter gray-brown when dry; only 55–75μ thick; surface glabrous, nodulated, cracked to the wood when dry. *P. cinerea* (6)
Whitish to ochraceous buff; thick (200–250μ), surface glabrous, cracking when dry to show the pure white tissue beneath; margin thin and fading away. *P. mutata* (7)
Margin distinct but irregular and byssoid when growing, in places connected with extensive ropy strands; color of surface buffy to chamois.....*P. filamentosa* (5)

1. **Peniophora gigantea** (Fr.) Massee.

PLATE 31

Patches up to 8 cm. wide by 14 cm. long, adnate, sub-waxy; when old smooth and even, when young slightly hypochnoid; color varies with age, grayish white or light cream to vinaceous buff when old; surface minutely granular under a lens; margin indeterminate when young, later determinate. Structure, in section, up to 1 mm. thick, made up of two distinct layers (apparently three before the application of KOH) of about equal thickness; lower layer consisting of closely packed, septate, considerably branched, clamp-connected hyphae (clamp connections are difficult to make out) 4.2μ thick which are more loosely packed at surface of substratum and become very closely packed toward the center of the plant; upper layer made up of closely packed, almost vertical hyphae with many faintly encrusted cystidia scattered throughout, which are 9.3–11.1μ thick. Basidia club-shaped with the end swollen, 4 × 11–18μ.

Spores oval, hyaline, smooth, 2–3.5 × 3.7–5.5μ.

Our plant agrees completely with plants of this species from Bresadola at the New York Botanical Garden Herbarium. The dried plant has a subtranslucent, parchment-like appearance.

4306. On ground side of new pine sills and leaves which had been on ground four months, Clark's Sawmill, May 10, 1920.

Common. Curtis (as Corticium).

2. **Peniophora albomarginata** (Schw.) Massee.

Stereum albobadium (Schw.) Fr.

PLATES 18 AND 31

Entirely resupinate or, when on the sides of branches, with a free shelving margin which is rarely over 7 mm. wide, beginning as subcircular or oblong patches which may later fuse into an extensive membrane, color of hymenium when damp a rich deep brown (about bister brown of Ridgway) with a conspicuous white margin which is sharply delimited and not byssoid; when dry the brown lightens to about avellaneous with a darker ring just behind the white margin; shelving part brown on back, inherently fibrous and roughish, not tomentose, obscurely zoned. The resupinate part can be removed from the wood without much difficulty as a pliable thickish membrane like chamois skin, which in cross section is concolorous, fibrous and about 0.6–0.8 mm. thick. The hymenium is not shining but has a velvety, glaucous appearance. When drying the plant does not crack, but remains a complete membrane.

Spores (of No. 3849) smooth, white, elliptic, some bent, 3–4 × 6.5–9.3μ. Basidia clavate, 7.2μ thick; sterigmata four. Cystidia pointed, encrusted with crystals.

This is treated as *Stereum albobadium* by Burt. We are not using the name *albobadium* because we do not want to make a new combination.

3849. Dead limbs of peach or cherry in a brush heap, December 9, 1919.
3873. On fallen branch of ironwood (*Carpinus*) in Arboretum, December 12, 1919.
3932. On dead sycamore limb, January 10, 1920.

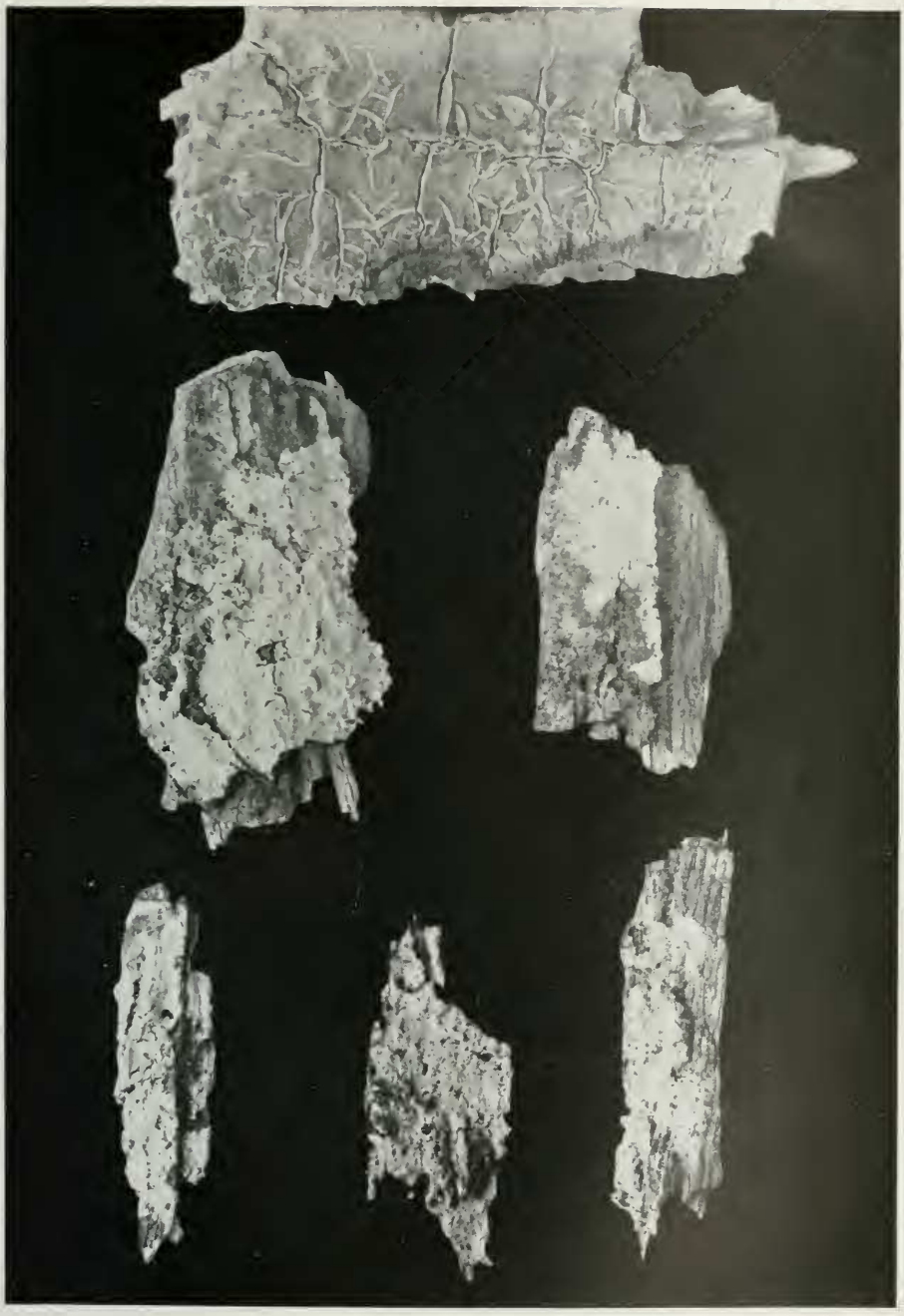
Hartsville, S. C. Several collections, December, 1919. Coker.
Low and middle districts on trunks and branches. Curtis.

3. **Peniophora violaceo-livida** (Somm.) Bres. in Bourdot and Galzin, Bull. Soc. Myc. Fr. 28: 405. 1912.

Corticium violaceo-lividum (Somm.) Fr.

PLATE 31

Entirely resupinate and crustaceous or rarely the margin curled up for 1–2 mm., thin and pliable and leathery when growing, the margin appressed and rather definite but extending with short fibers; the very margin whitish purple, then a handsome brownish purple, the older surface losing most of the purple and becoming dry and



PENIOPHORA MUTATA. No. 3993 [top].
PENIOPHORA LONGISPORA. No. 4242 [center].
CORTICIUM ARACHNOIDEUM. No. 4235a [below].

thinner and finely cracked, the cracks involving only the surface layer. Flesh brown, fibrous, about a quarter mm. thick near margin. The plant appears first as small, scattered patches with a plush-like surface which rapidly extend and coalesce to form large patches up to 6 cm. broad and 15 cm. long, perhaps larger at times. If protected in a Petri dish the growing margin becomes densely tomentose with short fibers of the same handsome purplish color. At full maturity the surface becomes glabrous.

Basidia club-shaped, 5.5μ thick, with four sterigmata. Spores (of No. 3914) white, elliptic, smooth, 3.6–4.4 × 6–8.5μ, rarely up to 10μ. Cystidia long, pointed, often crooked or constricted below, extending beyond the surface (at times twice as far as in the drawing), set with crystals. Bourdot and Galzin give the spores as 9–12 × 3–4.5μ; the basidia as 6–8 × 20–26μ

3914. On a dead stem of privet, December 20, 1919.
3946. On twig of Chinese privet (*Ligustrum Chinense*) in Arboretum, January 16, 1920.
3964. On *Baccharis* in Arboretum, January 17, 1920.

4. Peniophora longispora (Pat.)

PLATES 17 AND 32

Plant entirely resupinate, in patches up to 5 cm. long by 3 cm. wide and up to 148μ thick; open, hypochnoid, finely pubescent and somewhat resembling a mold; color light gray to white with small creamy areas, color depending upon age, margin indeterminate. Context made up of very loosely packed, much branched, clamp-connected, unencrusted hyphae 2.6μ thick. Hymenium of very inconspicuous basidia, mostly about 4.5μ thick, and many cystidia which are about 3.7 × 40μ, more or less pointed and encrusted with crystals and projecting far beyond the basidia. In untreated sections there is a distinctly darker region in the hymenium indicating the presence of numerous crystals.

Spores pure white, very long and peculiar, 2–2.6 × 13–16.6μ, pointed at both ends, straight or slightly bent and with two or three conspicuous droplets.

Bresadola's measurements in this species (as Kneiffia, l. c., p. 105) are: spores 2.5 × 12–15μ; basidia 5–6 × 30–32μ; cystidia 3–4.5 × 70–90μ, encrusted with granules.

4242. On bark of rotten oak limb, near Meeting of the Waters.
4250. On decorticated sycamore (?) wood, April 15, 1920.

4302. On rotten, decorticated oak wood, May 9, 1920. Spores white, smooth, very long-elliptic, some bent, 2.5–3.7 × 12–16μ. Cystidia thickly encrusted, slender, 4μ thick and up to 60μ long.

5. **Peniophora filamentosa** (B. & C.) Burt. Ms.

PLATE 32

Entirely effused and creeping irregularly over rotting bark or wood; margin distinct but irregular and byssoid when growing, in places connected with extensive ropy strands; surface when mature varying from dull buffy tan to chamois or even a deeper cinnamon buff at times, often with an olive tint, especially in youth; surface even, but responding to the substratum, having the appearance of chamois skin. Structure in section up to 350μ thick, composed of loosely woven, rather delicate, brownish hyphae, 3–4.5μ thick, without clamp connections, most of them heavily encrusted with crystals, some not; cystidia brownish, encrusted throughout or in places, about 6.5μ thick including crystals and projecting 11–30μ. They are hardly more than protruding hyphae and intergrade with them completely.

Basidia 4–spored, 5–6μ thick. Spores not found in our collection, said by Massee to be oblong-ellipsoid, 3 × 6μ.

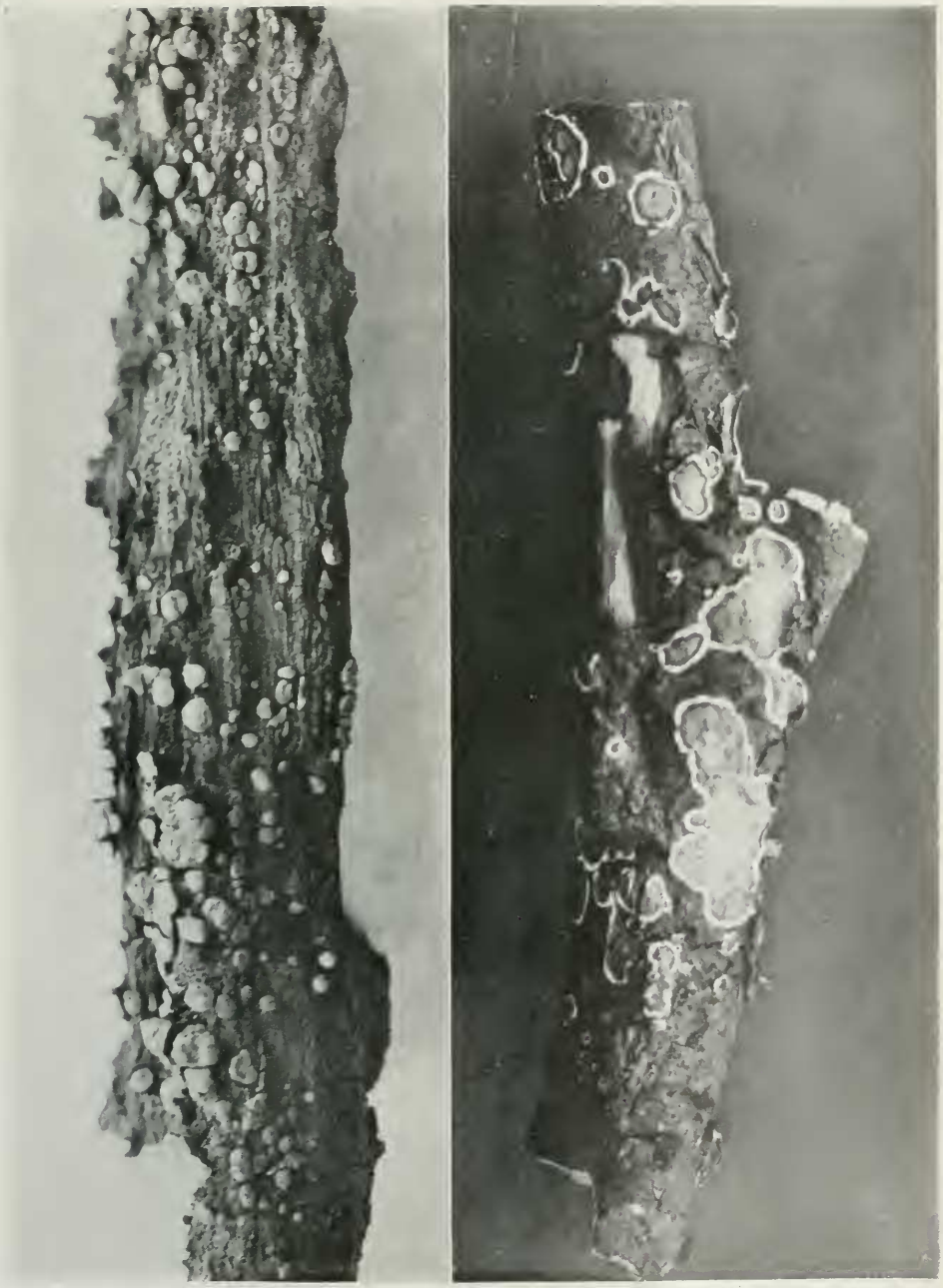
4245. On decorticated, rotten frondose wood, April 15, 1920.
4264. On rotten deciduous wood, April 17, 1920.
4607. On living and dead dogwood, July 31, 1920.

6. **Peniophora cinerea** (Pers.) Cooke.

PLATE 32

Extensively effused and combining into elongated irregular patches up to 10 or more cm. long at times, closely adnate and not removable, the rather definite margin not byssoid; in some fully developed specimens becoming thicker, almost as in Aleurodiscus; when damp a deep blackish brown with faint purplish tint, the substance rather waxy; when dry a much lighter grayish-brown, about ash color and cracking imperfectly into small irregular areas, the crack extending to the substratum. Surface glabrous, moderately nodulated both when wet and dry, nodules structural and not due to irregularities of the wood, although any irregularities also show. Entire thickness about 55–75μ.

PLATE 18



STEREUM FRUSTULOSUM. No. 1042 [left].
PENIOPHORA ALBOMARGINATA. No. 3849 [right].

Basidia 4.8–5.5μ thick, 4-spored, sterigmata very delicate. Cystidia oval to club-shaped, set with crystals, imbedded. Spores a clear salmon color, sausage-shaped, 2.5–3.4 × 7.4–9.5μ.

Our No. 4045 when compared with plants in the Curtis Herbarium and with others in the New York Botanical Garden Herbarium labelled *C. cinereum* agreed exactly. Bresadola (l.c., p. 104) gives the spores as 2.5–3 × 8–11μ, cylindrical and curved.

4045. On bark of dead branch of Crepe Myrtle, January 28, 1920. (Described above.)

4299. On bark of fallen oak limb, May 9, 1920. Spores curved-elliptic, 2.8–3.5 × 7–8.5μ.

Common on bark of limbs. Curtis (as Corticium).

7. **Peniophora mutata** (Pk.) Bres. In Bourdot and Galzin, Bull. Soc. Myc. Fr. **28**: 399. 1912.

PLATES 17 AND 32

Extensively encrusting the bark, forming large, thickish patches up to 20 cm. or more long and 6 cm. broad; white, then buff or ochraceous-buff, when wet nodulated and veined, but shrinking on drying and becoming plain, the smooth hymenium cracking to show the pure white, fibrous layer below which rarely cracks all the way through. Margin very thin and fading away to a film. Plant about 0.2–0.25 mm. thick, of which about half is the hymenium, the other half the white fibrous layer.

Spores white, rod-elliptic, 3.4–4.2 × 10–13.7μ. Basidia 7.7–8μ thick. Cystidia very few and scattered, mostly deep in the hymenium, a very few at the surface, club-shaped and covered with crystals.

This agrees in all respects with Peck's *Corticium mutatum*. Plants so determined at the New York Botanical Garden are the same as ours, and the careful description of Bourdot and Galzin agrees in all important particulars. They give the spores as averaging slightly longer, 3–5 × 8–16μ. There is also little doubt that this is *P. subgigantea* (Berk.) Massee, which was described by Berkeley from a collection of Ravenel on *Magnolia glauca*. Our plants are exactly like those distributed by Ellis on bark of Magnolia (N. Am. Fungi, No. 717). Another specimen on beech from Pennsylvania (at the New York Botanical Garden), which looks the same, was determined by Cooke as this. He says it is near *Corticium laeve*. A collection labelled C. *laeve* Fr. from Society Hill, S. C., on *Magnolia glauca* by Curtis is identical as is also a plant that Ellis distributed in his

North American Flora (No. 719 as *C. laeve* on Magnolia). Another from England (Berkeley) has the same appearance. They do not, however, agree with the description of that species by Wakefield (Trans. Brit. Nyc. Soc. 4: 115. 1912).

3993. On bark of dead *Magnolia tripetala*, January 21, 1920.

ASTEROSTROMA

Effused on rotting wood; soft and spongy; particularly characterized by deep brown, stellate cells (cystidia) included in the context and making up its greatest bulk; pale, simple, protruding cystidia also present in our species. We include the only species we have found.

Asterostroma cervicolor (B. & C.) Massee

PLATE 34

Extensively effused on very rotten deciduous wood, forming irregular patches up to 8–10 cm. or more wide and long; surface dull, minutely pruinose, pale fawn color when dry, deep dull brown when wet; margin fading out, indistinct, nearly concolorous. Texture soft and spongy except for a crust-like upper layer which may crack a little when dry, the thick, softer context not cracking. Distinctly but slowly bibulous, and soggy when wet.

Plant up to nearly 1 mm. thick. Hymenium 30–35μ thick, followed immediately by a very dense layer of stellate cells mixed with much granular material, below this a thick, much more open tissue, composed most conspicuously of the large stellate cells which characterize the genus. Mixed with these are bits of imperfect, fragmentary, very slender, hyaline hyphae and granular detritus. In the more open layer there may be a thin, much denser layer just like that beneath the hymenium. Many fat droplets are present in the cells of the hymenium.

Basidia projecting about 7–10μ, irregularly pole-shaped, about 4–6μ thick, with four slender, straight sterigmata about 4μ long. Cystidia broadly spike-shaped, almost colorless, with moderately thick walls, not encrusted, projecting a little farther than the basidia. Stellate cells deep brown, with about 4–12 spine-like arms which radiate from a central point and may be branched but are usually simple; their walls thick to very thick; arms variable in length, running from very short to 82μ long. These stellate bodies are evi-

dently of cellular origin and are formed apparently through the development of a single cell. Spores cream with a faint fawn tint in a heavy print, subspherical, angled or slightly tuberculate, 5–6μ thick.

4507. On very rotten oak wood and bark, south of athletic field, July 25, 1920.

HYPOCHNUS

Entirely resupinate, dry and coriaceous, felt-like or hypochnoid, that is, with the hyphae loosely woven throughout; hymenium even or papillose; basidia simple, four-spored; the spores rough or echinulate, distinctly colored in most species. The plants are saprophytic on rotten wood, and usually grow on the under-side of logs. Burt records 30 species from North America (Ann. Mo. Bot. Gard. 3: 203. 1916) of which several are mentioned from North Carolina. We are including two species to represent the genus. See also Wakefield, in Trans. Brit. Myc. Soc. 5: 476. 1917; Bourdot and Galzin, Bull. Soc. Myc. Fr. 28: 354. 1912 (as Gleocystidium in part).

KEY TO THE SPECIES TREATED

Color deep red-brown; surface very granular.....*H. atroruber* (1)
Color rusty brown with margin paler; surface felted.....*H. fuscus* (2)

1. **Hypochnus atroruber** (Pk.) Burt.

Zygodesmus atroruber Pk.

Entirely effused, thin, of a granular appearance, color a deep red-brown, about argus brown of Ridgway on the surface, the lower interior and the very thin, indefinite, hypochnoid margin a much lighter, honey color. Context of loosely interwoven, frequently branched, clamp-connected hyphae, paler and more delicate in the lower regions, about 4.5μ thick, reddish and coarser above, about 6–7.5μ thick; a few large strands next the substratum 15–18μ thick.

Spores brown under microscope, subspherical, echinulate, 5.5–7 × 6–7.7μ.

Our plants agree with Ellis No. 1390 of his North American Flora (on cedar) and with other collections on pine bark by Underwood, etc., at the New York Botanical Garden. They also agree well with Burt's description (l. c., p. 230). Peck found the type on poplar and Burt does not mention conifers, but all collections we have seen were on pine or cedar.

4692. On pine bark, spring of 1920.

2. Hypochnus fuscus Pers.

PLATE 32

Plant entirely resupinate and not removable as a membrane (Burt says separable), 300–500μ thick, more felted than hypochnoid, ferruginous-brown (dark cinnamon brown with brighter areas of Sudan brown) in center to light gray on the indeterminate margin, a slight vinaceous tint observable throughout or in places. Sections show such a packing of crystals as to make the structure unintelligible without the application of KOH (which dissolves the crystals); after such treatment the context is found to be composed of loosely packed, much septate and much branched hyphae 3.7–7.5μ thick, with clamp connections and bladder-like swellings up to 10.8μ thick. Hymenium composed of basidia 7.7–25.9μ, with four curved sterigmata and a few pointed structures which arise from the bases of the basidia. Spores smoky brown, irregularly angled and spiny, 5–7.4 × 7.4–9.3μ.

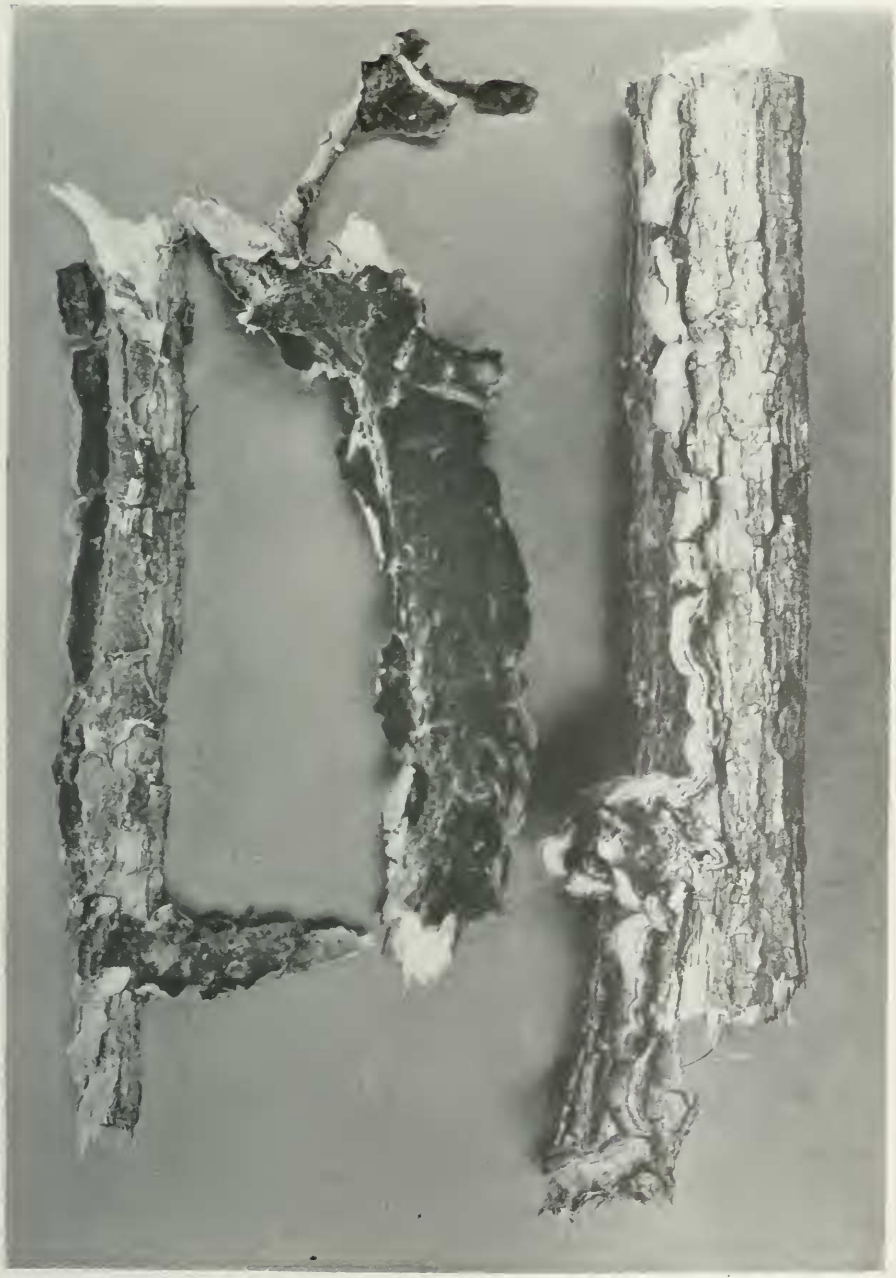
4267. On very rotten deciduous wood, April 18, 1920.

HYMENOCHAETE

Habit like that of a Corticium or small Stereum, that is, forming on dead wood an entirely resupinate crust or with the margin free and projecting like a bracket. Differing from these in the presence in the hymenium of elongated, smooth, dark, spine-like projections (setae) which extend beyond the basidia. Peniophora differs in the colorless cystidia which are usually set with warts and crystals, and which may or may not project beyond the basidia. We include but three species to represent the genus. For a full treatment, see Burt, in Ann. Mo. Bot. Gard. 5: 301. 1918. Also see Massee, in Journ. Linn. Soc. 27: 95. 1890.

KEY TO THE SPECIES TREATED

Hymenial surface not tomentose-felted
  Color a deep rich brown; the margin usually free.....*H. Curtisii* (1)
  Color slate-brown when wet, clay-brown when dry; margin not free.....*H. corrugata* (2)
Hymenial surface tomentose-felted, at least on the margin; usually rusty or brownish red, the margin paler.....*H. agglutinans* (3)



HYMENOCHAETE CURTISII. No. 3830.

1. Hymenochaete Curtisii (Berk.) Morg.

Stereum Curtisii Berk.

PLATES 19 AND 32

Extensively resupinate on the underside of oak branches and twigs, the free shelving margins extending about 4–8 mm. and forming extensive wings on both sides of the branch; dorsal surface of the caps zoned by ridges and colors, inherently fibrous, but not tomentose, rough, exactly the color of the oak bark (deep gray) except for a pale cinnamon marginal zone. Flesh very thin and cloth-like, quite pliable, not very strong, cinnamon color; distinctly stratified under the microscope. Hymenium a deep rich cinnamon brown (about argus brown of Ridgway) at all ages unless much weather-worn, then paler; velvety from the close-set, short, curled and looped hairs among which are scattered longer and stouter, straight, tapering, red spines which project up to 60μ. These last are very scattered and are apt to be missed unless several sections are studied. They are dark internally and most show a sheath-like hyaline thickening of the wall, which is most conspicuous below.

Spores (of No. 3830) white, smooth, curved, 1.5–2.8 × 6–8.2μ.

Not rare on post oak limbs, where it extends as a complete cover over the underside of dead branches for a considerable distance, often several feet. This habit, with the deep, rich color and narrow wings, will easily determine it.

3805. On an oak twig, November 29, 1919. Young plants.
3830. On post oak twigs, December 6, 1919. Photo.
3842. On a fallen oak limb, December 7, 1919.
3843. On a fallen post oak branch on campus, December 7, 1919.
3875. On a fallen oak limb, December 11, 1919.
3899. On a branch of white oak, December 14, 1919.

Common on the bark of white and post oaks. Curtis.

2. Hymenochaete corrugata (Fr.) Lév.

PLATE 32

Extensively effused and entirely adnate and not removable; surface tuberculate, dull but not pulverulent, much cracked when dry, color when wet slate-brown with a tint of clay, when dry a lighter clay-brown except for the abrupt margin which is black on its very edge; thickness of entire fructification about 225μ, the cystidia pointed, brown, with a colorless sheath, projecting about 75μ from the surface.

Spores white, elliptic, smooth, 3 × 7.3–8.1μ; basidia about 4.8μ thick, projecting (including the 4 sterigmata) about 7.5μ beyond the surface.

When put in water the hymenium is not wetted, but is finely silvered by a film of air.

4076. On a corticated branch of a deciduous tree, February 4, 1920.

Common on bark and wood. Curtis (as Corticium).

3. Hymenochaete agglutinans Ellis

Forming circular or elongated patches up to 2 or more cm. across which fuse on touching and also firmly bind together any two branches in contact in its course; growing margin thick and definite, pure white, tomentose, older surface distinctly zoned with brown and brownish red, covered entirely or in all except the older parts with a thin, felted whitish or tan or drab or rich brown superficial coat. Substance firmly leathery, tough, solid, about 500–700μ thick; yellowish, except for the red upper layer which is about 75μ thick, and which is at first covered with the looser, felted, tomentose, paler coat in which are the strong, red, pointed cystidia which project about 37–70μ above the felt. These are lost as the felt wears away and are absent in the older, smoother parts. Threads of the context about 2.5–3μ thick, much branched. Context very compact and solid, resembling a real tissue, but bibulous, at least in the surface layer.

No spores or basidia could be found in our collections, and they are not mentioned by Ellis (Bull. Tor. Bot. Club 5: 46. 1874).

On drying the margin may become elevated in places, pulling up the upper layer of the bark with it. It does not become truly free as in *H. Curtisii*. The species is certainly parasitic, at least after getting started.

4694. On living branch of buckeye, New Hope Swamp, December 4, 1920.

4743. On living branch of hornbeam, University Station, N. C., January 7, 1921.

CORTICIUM

Plants forming an entirely resupinate, encrusting, thin layer which is usually leathery and fibrous or hard and brittle, in some cases waxy when damp; hymenium without specialized cells projecting or included. Spores smooth, or rarely angled, white, or (when fresh) pink. When pink the color of the spores fades soon in the herbarium. Most of the species are saprophytic on wood or bark

or more rarely on the ground and over mosses, etc., but a few are parasitic as e. g., *C. Stevensii* and *C. vagum* (see below). We are including *C. lilacino-fuscum* in Corticium for convenience, as it has only a very narrow reflexed margin, if any. Burt treats it as a Stereum. We include only a few of the numerous North Carolina species. Burt has treated three parasitic species in Ann. Mo. Bot. Gard. 5: 119. 1918. For important papers on the genus see Massee in Journ. Linn. Soc. 27: 117. 1890; Wakefield, Trans. Brit. Myc. Soc. 4: 113. 1913; Bourdot and Galzin, Bull. Soc. Myc. Fr. 27: 223. 1911 (this gives microscopic characters of the French species); Bresadola, Ann. Myc. 1: 93. 1903; Bresadola, Fungi Tridentini 2: 36 & 57.

KEY TO THE SPECIES TREATED

Not parasitic on leaves and twigs of fruit trees.
- Color deep blackish indigo blue when damp ..... *C. caeruleum* (1)
- Color creamy gray with a lilac tint ..... *C. lilacino-fuscum* (2)
- Color sordid whitish or cream to pallid yellowish or ochraceous; surface cracking when dry into easily removable, rather chalky scales ..... *C. scutellare* (3)
- Color pale flesh both when wet and when dry, cracked when dry; on deciduous woods ..... *C. roseum* (4)
- Color of mycelium and context deep orange, of hymenium pale sulphur; growing on grapevines ..... *C. Viticola* (5)
- Color pure white, margin pulverulent or hypochnoid ..... *C. arachnoideum* (6)
- Color light slate when wet, yellowish gray when dry; texture wefty and resembling a mold ..... *C. vagum* (7)
- Much like *C. vagum* in color and texture, but spores smaller and hyphae with clamp connections ..... *C. subcoronatum* (8)

Parasitic on apple, pear, or quince and forming a pinkish buff felt on the lower surface of the leaf and also brown sclerotia on the twigs ..... *C. Stevensii* (9)

1. **Corticium caeruleum** (Schrad.) Fr.

Thelephora indigo Schw.

PLATE 33

Forming small or large patches up to 9 cm. long on twigs and small branches of deciduous woods with the bark on; closely applied to the bark, dull, when damp deep blackish indigo blue with more or less gray tint, when dry blackish gray with often only a faint tint of blue; the margin whitish, well defined, irregular. When well grown the surface cracks into many small, unequal areas and has a thickish,

somewhat tuberculate look. Flesh 180–260μ thick, a beautiful clear indigo in thin sections except for the outer part of the hymenium, which is suddenly colorless.

Spores white, elliptic, smooth, 4.3–5.2 × 8.5–11μ. Basidia 6.5–7.5μ thick, irregular. The spores sprout very soon in a damp chamber, the filaments coming usually from one side of the distal end.

Easily recognized by the color and finely cracked surface. Massee's colored figure (Pl. 33, fig. 3) does not represent well the color of our plant, but there seems to be no doubt of its identity. Plants in the Curtis Herbarium from South Carolina, Alabama and England are the same. The miscroscopic characters as given by Bourdot and Galzin also agree.

3997. On California privet by President's house, January 21, 1920.
4018. On standing branches of privet and crepe myrtle, January 24, 1920.
4722. On privet in President's yard, December 10, 1920.

Common on wood and bark. Curtis.

2. Corticium lilacino-fuscum B. & C.

Stereum roseo-carneum (Schw.) Fr.

PLATE 33

Extensively effused; margin definite, not fimbriate; not removable. When wet membranous and soft, pale creamy gray with distinct tint of lilac; when dry slightly duller and cracking through the hymenium into numerous, rather small areas, showing the whiter context beneath, not tuberculate except over the inequalities of the bark. Entire thickness about 185μ; the context composed of rather loosely woven, clear threads, 2.4–3.5μ thick, with clamp connections and many crystals. In the hymenium are numerous slender paraphyses with short branches near their ends. Unfortunately our figure shows only one and that not branched. Basidia 6.3–7.5μ thick; up to 30μ long, 4-spored.

Spores white or pale cream, smooth, elliptic, 3.8–5.5 × 7–9.3μ, easily collapsing.

Our plants agree with plants so named from Ellis (N. Am. Fungi, No. 515), and with Burt's description and figure of *Stereum roseo-carneum*. In treating this as a Stereum, Burt is no doubt right, but for convenience we retain it for the present in Corticium.

4071. On bark and wood of an oak limb, February 4, 1920.

3. Corticium scutellare B. & C.

PLATE 34

Extensively effused on corticated or decorticated wood, cracked into innumerable small areas, inseparable as a whole, but when dry the upper, rather friable and chalky part is easily removed from a thin white layer covering the wood; color varying from sordid white through cream or clay to pallid yellowish or ochraceous; obscurely nodulose; margin fading quickly out to a thin granular-looking edge, not byssoid. Entire plant about 148–260μ thick; hymenium about 65–75μ, no cystidia. Clearing with potash shows a dark, dense layer of about the same or greater thickness beneath the hymenium, and a thinner, more delicate, pale layer next the wood; hyphae delicate, 2.5–3.5μ thick.

Spores long-elliptic, 4 × 7.5–9.3μ. Basidia slender, long-clavate, about 7.4μ thick, with four long sterigmata.

This matches well with a collection from Bresadola so named at the New York Botanical Garden, and agrees well with the original description (Grevillea 2: 4. 1873).

4043. On a very rotten but partly corticated branch of *Aesculus octandra*, January 21, 1920.

4223. On bark of oak wood, March 27, 1920. Spores subelliptic, 4.4–5.1 × 9.3–10μ.

4696. On bark of limb from a deciduous tree (birch or cherry), December 4, 1920. Spores (print) subelliptic, some slightly curved at mucro end, hyaline, 3.7–4.5 × 7–9μ.

Common on bark of limbs. Curtis.

4. Corticium roseum Pers.

PLATE 33

Plant effused, arising as small patches which fuse on meeting without leaving a trace of the line of junction; margin definite and at times a little uplifted, furnished with a very narrow white fringe of fine fibers when growing; surface smooth, dull with the appearance of fine felt, pale flesh color both when wet and dry, cracked when dry, the cracks reaching nearly to the substratum, but usually showing at the bottom the white fibers of the subiculum; 140–280μ thick; threads of context not densely packed, 2.8–3.8μ thick, with clamp connections. Hymenium dense, about 50μ thick, composed, in addition to the basidia, of crowded, much-branched, more or less contorted threads, the tips of which extend above the general surface and help to give the prüinose appearance.

Basidia 4-spored, long club-shaped, about 7.5μ thick and projecting about 40–50μ; sterile cells of much the same appearance are scattered among them and may be young basidia. Spores (of No. 4703) clear salmon, smooth, elliptic, 5.5–7.5 × 9.3–13μ, granular, sprouting over night in a damp chamber.

Our plants agree perfectly with a collection of *C. roseum* from Bresadola at the New York Botanical Garden and with collections so named at Washington. Dr. Burt has seen our No. 3981 and determined it as *C. roseum*.

3981. On decaying hickory tree, January 18, 1920. Hyphae delicate, clamp-connected, 3–4μ thick. Spores smooth, subelliptic, 4.5–6 × 10–15μ.

4703. On bark and wood of branches of *Salix sericea*, Glen Burnie Farm, December 5, 1920.

5. Corticium Viticola (Schw.) Fr.

PLATE 33

Plants appearing as small, irregular patches with deep orange-red centers and paler byssoid margins which extend and fuse to form elongated crusts up to 2 or more cm. long and 1 cm. wide. Hymenium forming irregularly and at times in scattered patches, again continuous, pale sulphur yellow, with the appearance of fine leather, about 45–50μ thick; the substance below about 185–250μ thick and composed of very loosely woven, rather even threads about 3–4μ thick, without clamp connections, which are usually a deeper, more orange color.

Spores white, smooth, elliptic, with one side flattish, 5–5.5 × 8.5–9.4μ

Among the layers of the bark run deep orange rhizomorphic strands with byssoid fringes which connect with the superficial part.

4693. On dead bark of a live grapevine, New Hope Swamp, December 4, 1920. Middle and upper districts on bark of grapevines. Curtis.

6. Corticium arachnoideum Berk.

PLATES 17 AND 33

Effused irregularly over area of several centimeters, closely adherent, color pure white; margin indistinct and pulverulent or hypochnoid, in center thicker and smooth, and in most places minutely powdery, having the appearance of a thin white-wash. In section about 111μ thick; context made up of very loosely packed, clamp-

connected, incrusted (so as to look very rough-walled) hyphae, 4.2μ. thick; hymenium about 18μ thick, made up entirely of young and old basidia, which are clavate, 4.8μ thick, with four minute sterigmata; no cystidia, but at base of the hymenium is a layer of crystals which KOH does not dissolve entirely.

Spores white, short-elliptic, hyaline, 2.5–3.5 × 3.8–5μ.

When compared with specimens of *C. arachnoideum* from New Jersey (Ellis and Everhart, Fungi Columbiana No. 309) at New York Botanical Garden, our plants agreed exactly and Dr. Burt has kindly confirmed the determination.

4235a. On very rotten, decaying, deciduous wood, March 25, 1920.

Common on wood and bark. Curtis.

7. Corticium vagum B. &. C.

Corticium botryosum Bres. Ann. Myc. 1: 99. 1903.

PLATE 33

Entirely resupinate, pulverulent-looking, margin indeterminate; easily separable from the substratum when wet, and with an open wefty structure that resembles a mold; color when wet, light slate, drying to a yellowish gray. Structure in section about 240μ thick, consisting of very loosely packed, very large (7.4μ thick,) considerably branched, frequently septate hyphae without clamp connections which are *yellowish* towards the substratum.

Spores subelliptic (flat on one side, curved on the other), pointed at each end, 3.8–5.5 × 7.5–11μ. Basidia simple, very peculiar, hardly distinguishable from the hyphae and not forming a distinct hymenial layer, 7.4–9 × 18–25μ, with two, four or six curved sterigmata. No cystidia.

The small group of Corticiums to which this species belongs is peculiar in the undifferentiated condition of the fruiting surface. There can scarcely be said to be a hymenium any more than in a mold. The plant is at times parasitic, again saprophytic. Burt (l. c.) has studied it along with two other related species and his description agrees substantially with ours. *Hypochnus Solani*, *Corticium Solani* and *Rhizoctonia Solani* are the same as this. Our plant also agrees in all important particulars with Bresadola's description of his species and with the more detailed description by Miss Wakefield (Trans. Brit. Myc. Soc. 4: 117. 1913).

4230. On bark of a dead poplar limb, April 4, 1920.
4236. On inside of decaying poplar log, April 15, 1920. Spores pointed, subelliptic, 3.7–4.5 × 8.5–11.5μ.
4259. On bark and wood of dead pine, April 15, 1920.
4276. On dead pine wood, April 20, 1920.

8. Corticium subcoronatum v. Hoehn. and Litsch.

Adnate, thin, pulverulent-looking, so loosely woven as to be lacunate under a hand lens, when wet slate colored, drying to whitish gray; margin indeterminate. Structure in section after application of KOH about 90μ thick, made up of extremely loosely packed, much branched, clamp-connected, hyaline hyphae 5.5–7.4μ thick; no definite hymenial layer present but basidia are borne on the tips of much branched hyphae at outer surface and the large number of collapsed basidia give the appearance of a layer of crystals; basidia 6.6–7.4 × 12.5μ, with four sterigmata and not distinguishable from hyphae except for the presence of sterigmata.

Microscopic appearance like *C. botryosum*, but differing in section in that the present plant has more delicate hyphae which are not yellowish at base as in *C. botryosum*, and has clamp connections at septae and smaller spores than the latter. See Wakefield in Trans. Brit. Myc. Soc. 4: 118. 1913.

4271. On bark of very rotten oak log, near Meeting of the Waters, April 18, 1920.

9. Corticium Stevensii Burt.

While we have not found this in Chapel Hill, its frequent presence in the mountain region of this state and its importance as a parasite of apples, pears, and quinces leads us to include it here. We adapt the following condensed description from Stevens and Hall (Ann. Myc. 7: 49. 1909, as *Hypochnus ochroleucus*) and from Burt (l. c., p. 125):

Fructification forming a felty, dull pinkish buff, easily removable membrane on the under side of the leaf; hyphae 4.5–7.5μ thick, not nodose septate, bearing the basidia scattered along them on short lateral branches; basidia 7–8 × 11μ, with 4 sterigmata; spores hyaline, flattened or slightly concave on one side, 3–4 × 8–11μ.

The vegetative mycelium lives on the twigs and forms there chestnut-brown Sclerotia from which rhizomorphic strands run to the leaves and are dissipated into the fructifying hyphae.

Stevens and Hall report the fungus from numerous places in western North Carolina where it does much damage to neglected orchards. The species is evidently related to *C. vagum*, and a true hymenium is absent.

STEREUM

Plants growing on wood in all species here treated; thin, flat, tough and leathery, or more woody and rigid; petal- or bracket-shaped; in our species usually growing horizontally with a broad attachment directly from the wood or from a more or less extensive resupinate portion; dorsal surface often velvety or hairy, concentrically zoned and radiately strigose or rugose; hymenium quite smooth and not furnished with sterile spines (setae) projecting among the basidia, but cystidia or paraphyses may be present; basidia simple, spores smooth in our species, nearly white to pale smoky flesh color in a good print. Some species exude a colored juice from the wounded hymenium when in a growing condition. Burt has recently published his monograph on the American species in Ann. Mo. Bot. Gard. **7**: 81. 1920. He records twenty species from North Carolina (including *S. fuscum*), two of which we are treating under Peniophora and Corticium. Two of these North Carolina species grow on the ground, both reported from the mountains. See also Massee, Journ. Linn. Soc. **27**: 158. 1890. I am under obligation to Dr. Burt for having determined a number of my plants. For interesting remarks on *S. abietinum* Pers. see N. Y. Sta. Mus. Bull. 219, 220, p. 54, containing Report of Director for 1918. 1920.

KEY TO THE SPECIES TREATED

Plant forming small tuberculate bodies like crowded molar teeth; hymenium with many warted cystidia ..... *S. frustulosum* (4)

Not as above.

Hymenium becoming reddish when bruised.

Growing on frondose wood; surface tawny ..... *S. gausapatum* (1)

Growing on frondose wood; surface blackish with rusty margin; texture hard and woody when dry ..... *S. subpileatum* (3)

Growing on pine; surface pallid ..... *S. sanguinolentum* (2)

Hymenium turning dark brown when bruised ..... *S. fuscum* (10)

Hymenium not becoming red or brown when bruised (*S. subpileatum* and *S. fuscum*, in which the hymenium changes color when bruised are included below, as this character is obscure except when quite fresh.)

Dorsal surface grayish, zoned, coarsely hairy.....*S. fasciatum* (5)
Dorsal surface grayish, zoned, tomentose; plant small, growing on cedar.....*S. rameale* a form (7a)
Dorsal surface in large part smooth and shining; chestnut or lighter reddish-brown, tomentose at base and at times on some of the zones.....*S. rameale* (7)
Dorsal surface satiny-tomentose, with zones of tan, cinnamon, reddish-brown, etc.....*S. lobatum* (6)
Dorsal surface smooth, silky-shining, pale tan to whitish.....*S. sericeum* (8)
Dorsal surface white when dry and densely woolly hairy all over; hymenium golden yellow when dry; plant small.....*S. ochraceoflavum* (9)
Dorsal surface dull brown, subtomentose on the whitish margin; flesh spongy.....*S. fuscum* (10)
Dorsal surface smoothish or more or less scurfy-tomentose, particularly towards the margin; deep purplish brown or blackish, margin tawny when growing.....*S. subpileatum* (3)

1. Stereum gausapatum Fr.

S. spadiceum Fr.

PLATES 20 AND 35

Plant laterally sessile forming a complicated mass of branched, wavy, imbricated, horizontal caps which project a distance of about 1.5–5 cm.; a compound group at times extending laterally up to 8–9 cm. Dorsal surface zoned frequently with ridges and proliferations, densely matted tomentose all over; color when damp dull tawny with brownish zones, the margin reddish brown (where the reddish flesh shows through the thinner tomentum), when dry all parts are a clearer tawny or buffy tawny except for a narrow reddish margin. Hymenium wavy and undulating to form radial ridges, when damp dull dark brown with a tint of bay, the marginal part for about a cm. being reddish ochraceous; all parts of the hymenium turn instantly dull red when bruised and emit a little reddish latex. When dry the hymenium becomes a somewhat lighter dull smoky buff or tan with a faint fleshy tint. Flesh when wet very tough and pliable, about 0.5 mm. thick, deep reddish brown, the hymenium about 0.4 mm. thick (unusually thick for a Stereum) and the tomentose coat about 0.6–1.4 mm. thick; tasteless and odorless. When dry the caps are rigid and rather brittle.

Spores (of No. 4110) pale creamy flesh, smooth, elliptic, 2.5–3.7 × 6–8.5μ.

PLATE 20

STEREUM GAUSAPATUM. No. 3821.

Not rare on rotting oak stumps and logs. The species is easily recognized by its good size, complicated structure, tawny and tomentose surface and dark hymenium which turns red at once when bruised. It differs from *S. sanguinolentum* in tawny color and growth on oak. The latter is pallid and grows on pine.

334. On the base of a rotten oak stump, October 4, 1908.
3821. On oak log at "Long Bridge," December 5, 1919. Spores 3–3.8 × 6–8.2μ.
3912. On dead oak log by Battle's Branch, November 5, 1919.
4110. Oak limb by Battle's Branch, February 13, 1920.

Common on trunks and stumps. Curtis
Blowing Rock. Atkinson.
South Carolina, Hartsville. Coker.

2. Stereum sanguinolentum (A. &. B.) Fr.

PLATE 35

Largely resupinate, the upper margin reflexed and bracket-like, in our plants extending only about 4–5 mm.; surface of the free caps inherently fibrous, radiately striate, zoned lengthwise by thin brown lines, the remainder nearly white or brown, the thin margin white; flesh leathery, tough, elastic, thin. Hymenium more or less wrinkled and ridged, when young whitish (very pale fawn) sooner darker through light fawn to dusky fawn; when bruised in the fresh state immediately exuding a deep red juice which stains the surface, later the stained parts becoming dark dusky brown with only a tint of red.

Spores (of No. 3967) white, sausage-shaped, 2–3 × 6–8.5μ.

Easily distinguished from others that turn red by growth on pine and different color. Our plants form patches about 1.5–2 × 1.5–4 cm., some with and some without the narrow reflexed margin. If soaked again after drying the hymenium turns red almost all over and on drying again darkens to a very deep brown, the margin only remaining white.

3967. On a pine log, January 17, 1920. Photo.

Low and middle districts on pine trunks. Curtis.

3. Stereum subpileatum B. &. C.

PLATES 21 AND 35

Plants bracketed from a resupinate layer, extending about 1.5–5 cm. or more, often anastomosing and contorted; dorsal surface velvety-scurfy when young and more or less persistently so, the older

part often quite smooth; multizonate, the more conspicuous zones with obscure ones between; usually crimped and waved to form radiating ridges like an oyster or pecten shell; color on younger growing margin buff-tawny, then dull tawny-brown or at times abruptly blackish-brown, with dull purple zones and often deep gray zones near the margin. Flesh about 0.5–0.8 mm. thick, very hard and woody, not at all pliable when dry, composed of four distinct layers, the lower, just under the pale hymenium, thickest, ochraceous buff color, with vertical fibers and distinctly stratified in old plants (this representing the different layers of old hymenium); the next layer thinner (unless plant is young) and lighter with horizontal fibers; the next thinner still and black or nearly so and hard and shining like rosin; the upper brownish and densely spongy; threads of flesh densely packed, 3–4μ thick, without clamp connections. Hymenium smooth, pale creamy flesh color, cracking in age, often wrinkled and nodulated and obscurely zoned, becoming dull brownish red when bruised in the fresh state.

Spores (of No. 3828) smooth, white, oval, 2.5–3.7 × 3.8–5.5μ. Cystidia numerous, encrusted, blunt, about 5.2–7.5μ thick, projecting about 7.5–11μ—a few bottle-brush paraphyses were seen in our preparations.

The caps are perennial, the new growth arising from the lower layer of flesh only, and forming a new hymenium over the old one. Old plants may be practically black and the old hymenium may become straw color or dull creamy yellow with discolorations due to black or green molds. It is not often that one finds plants in so fresh a condition as to show the change to reddish in the hymenium, but the plant is easily determined by its other characters. Rare at Chapel Hill; apparently more common in the Coastal Plain. Our plant is just like *S. subpileatum* B. & C., as represented by No. 219 in the Ravenel Exsiccati. *Stereum sepium* is very near, but is separated by Burt on account of the abundance of bottle-brush paraphyses. *Stereum insigne* also differs in having many such paraphyses and in the absence of cystidia. *Stereum rugosum* has been considered in a different section on account of the red juice in its hymenium, but in our collections of *S. subpileatum* the hymenium also turns red when bruised, a fact which has not been mentioned by others. There is, however, no obvious juice in the latter.

2837. On an oak log, September 23, 1917.

3828. On the same log as No. 2837, December 6, 1919.

PLATE 21

STEREUM SUBPILEATUM. Nos. 1522 and 2837 [above].
STEREUM FUSCUM. No. 689 [center].
STEREUM RAMEALE. Nos. 3813 and 3825 [below].